DIPLOMA IN ELECTRONICS AND ADVANCED TECHNOLOGY

DEPARTMENT OF PHYSICS
MALABAR CHRISTIAN COLLEGE
CALICUT.

Duration: 12 months.

Programme: Diploma in Electronics and Advanced Technology

Skills and knowledge are the driving forces of economic growth and social development. The University Grants Commission (UGC) had launched a scheme for skills development based higher education as part of college/university education. This Diploma Course is intended to give the Basics Knowledge and the Practical Skill Development; would enable the Students to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge of various advanced Technology-Equipment, which is being regularly used in our Day to day life.

Objectives:

- To mold the students to survive with an outstanding career-oriented base to meet the growing challenges with an adequate understanding of scientific research, software to hands-on skills.

- To provide a platform to build-up knowledge from basic level to career -oriented skills in the field of electronics and to generate More Job Placement Opportunities.

- To train the students to work professionally in one or more of the following areas: analog electronics, digital electronics, communication systems, photonics, microprocessor and microcontroller, power electronics, semiconductor devices, biomedical instrumentations and circuit designing and analysis with software.

- To create strong foundations to qualify them for continuing education, synthesizing analytical competence, technical skills, and scientific research intellect.

- To produce graduate with up-to-date technical skill, adequate communication skill, and team work capability to serve in the electronics, industries and allied sectors.

Programme Outcomes:

At the end of the program, students are expected to have developed the following

Outcomes.

- Develop deep understanding of working and principles of various electronics circuits.

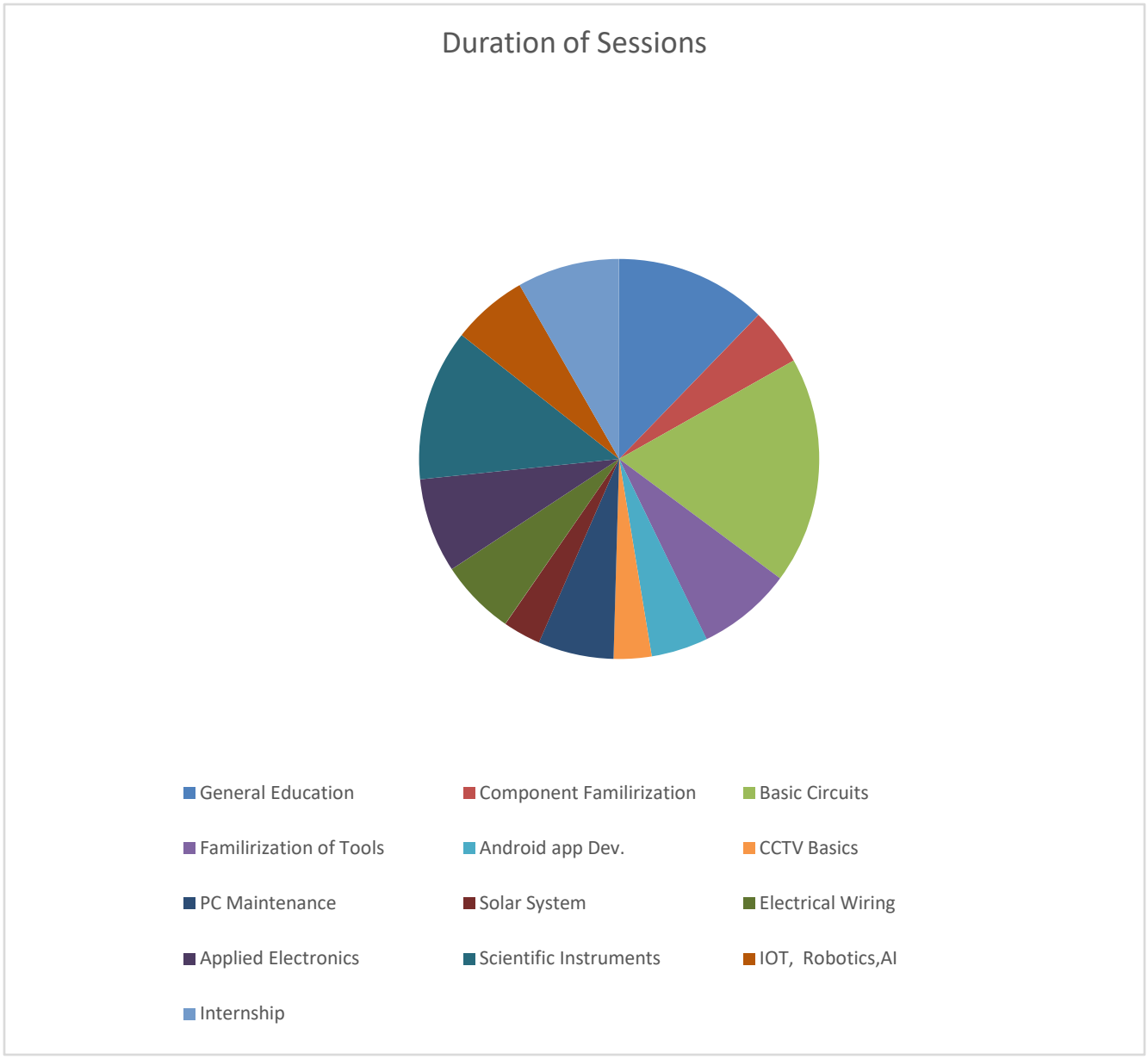
- Develop an ability to use the techniques, skills, and modern electronics tools and devices with advanced software's.

- Understand the basic concept of circuits, various semiconductor devices, solar systems, electrical wiring, various scientific devices, home appliances, Android app development, IOT, AI etc. and their applications in different fields.

- Enhance communication skills and team work capability by attending seminars, group discussions, interactive sessions etc.

- Know the latest development in industries, research and teaching by attending internship in different industries, research laboratories and universities/institutions of state and national level.

Course Structure- ELECTRONICS & ADVANCED TECHNOLOGY



Course Structure- ELECTRONICS & ADVANCED TECHNOLOGY

Syllabus

Semester 1

Sl. No	Course code	Course Title	Hours/week	Credits	Marks		
					Internal	External	Total
1	GEC1EG03	English A03	4	4	20	80	100
2	GEC1ML02 GEC1HD02 GEC1GN02	Additional Language A 07(Malayalam) Additional Language A 07(Hindi) Additional Language A07(GERMAN)	4	4	20	80	100
3	GEC1BC03	BASIC CIRCUIT THEORY AND NETWORK ANALYSIS	4	4	20	80	100
4	SDC1BE01	BASIC ELECTRONICS AND CCTV	4	4	20	80	100
5	SDC1MA02	MOBILE APPLICATION PROGRAMMING	4	4	20	80	100
6	SDC1PC03	PC Hardware & Networking	4	4	20	80	100
7	SDC1PL04	Practical I	8	6	20	80	100
			30	**30**			**700**

Semester 2

Sl. No	Course code	Course Title	Hours/week	Credits	Marks		
					Internal	External	Total
1	GEC1EG04	English A04	4	4	20	80	100
2	GEC1ML05 GEC1GD05	Additional Language A 07(Malayalam) Additional Language A 07(Hindi) Additional Language A07 (GERMAN)	4	4	20	80	100
3	GEC2BN06	Basic Numerical Skills	4	4	20	80	100
4	SDC2FB05	Familiarization of Basic Tools it's Operation, Solar Systems, IOT and AI	4	4	20	80	100
5	SDC2AE06	Applied Electronics Maintaince of scientific Instruments and PCB Design	4	4	20	80	100
6	SDC2 PL07	Practical II	8	5	20	80	100
7	SDC2IP08	Internship	5	5	-	100	100
			30	**30**			**700**

Detailed Syllabus for Core Course: Electronics & Advanced Technology

Semester-I

COURSE TITLE: BASIC CIRCUIT THEORY AND NETWORK ANALYSIS

Course code: GEC1BC03

Credits: 4 **No. of Classes: 60 Hours**

Total Theory Marks: 80.

Course Objectives:

The given paper is to impart the basic concept of circuits and its analysis for both AC and DC. This course helps students to simplify complicated circuits with network theorem and includes familiarization with various electronic components and verification of different network theorems.

Unit- (13 Hours)

Basic Circuit Concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, Color coding of resistors, resistors in series and parallel.

Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Testing of resistance and inductance using multimeter.

Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, Construction and application, capacitors in series and parallel, factors governing the value of capacitors, testing of capacitors using multimeter.

Unit- 2 (13 Hours)

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis,

Mesh Analysis, Star-Delta Conversion.

DC Transient Analysis: RC Circuit- Charging and discharging with initial charge, RL Circuit with Initial Current, Time Constant, RL and RC Circuits with Sources, DC Response of Series RLC Circuits.

Unit-3 (18 Hours)

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis for RL, RC and RLC Circuits, Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality

(Q) Factor and Bandwidth. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop

(qualitative ideas only).

Unit-4 (16 Hours)

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorem. Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

Reference:

1. S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
2. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw- Hill.(2005)
3. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
4. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)
5. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008)

Semester-I

COURSE TITLE: Basic Electronics and CCTV

Course Code: SDC1BE01

Credits: 4 **No. of Classes: 60 Hours**

Total Theory Marks: 80.

Objectives:

This part gives a basic idea about Basic Electronics Components and their working including Resistor, Potentiometer, Presets, Capacitor, Inductor, Diode, Zener diode, Transistor, MOSFET, IGBT, Relay, Regulator IC, General IC's, Thermistor, Different Transducers, Transformer and CCTV.

Unit 1.Familiarization of Basic Electronic Components

(8 Hours)

Semiconductor Basics: Types and Properties

Basic Electronics Components and their working including Resistor, Potentiometer, Presets,Capacitor, Inductor, Diode, Zener diode,Transistor, IGBT, Relay, Regulator IC, General IC's, Thermistor, LDR, Transformer, Transducers.

Unit 2.Basic Theories (8 Hours)

Resistance in series and Parallel, Capacitance in series and parallel, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Resonance Circuits , Snubber Circuits, Maximum Power Transfer Theorem, Familiarization of Microcontroller, Programming Basics.

Unit 3 (16 Hours)

Bipolar Junction Transistors (BJT): PNP and NPN Transistors, Basic Transistor Action, Emitter Efficiency, Base Transport Factor, Current Gain, Energy Band Diagram of Transistor in Thermal Equilibrium, Quantitative Analysis of Static Characteristics (Minority Carrier Distribution and Terminal Currents), Base-Width Modulation, Modes of operation, Input and Output Characteristics of CB, CE and CC Configurations.

Unit 4 (18 Hours)

Field Effect Transistors: JFET, Construction, Idea of Channel Formation, Pinch-Off and Saturation Voltage, Current-Voltage Output Characteristics. MOSFET, types of MOSFETs, C and P Channel) and Enhancement type MOSFET (both N channel and P channel). Complimentary MOS (CMOS).

Power Devices: UJT, Basic construction and working, Equivalent circuit, intrinsic Standoff Ratio, Characteristics and relaxation oscillator-expression. SCR, Construction, Working and Characteristics, Triac, Diac, Circuit symbols, Basic constructional features, Operation and Applications

Unit 5

CCTV Basics (14 Hours)

CCTV Camera, Resolution, Commonly used Video format, Hard Disk, Digital Video Recorder, Configuration, Wiring of CCTV System, Setting / Configuration of Video and audio in Mobile phone etc. Wiring and setting up CCTV system, Record and retrieve the data, Familiarization of Network Camera & DVR

Suggested Books:

1) S. M. Sze, Semiconductor Devices: Physics and Technology, 2ndEdition, Wiley India edition (2002).
2) Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education (2006)
3) Dennis Le Croissette, Transistors, Pearson Education (1989)
4) Jasprit Singh, Semiconductor Devices: Basic Principles, John Wiley and Sons (2001)
5) Kanaan Kano, Semiconductor Devices, Pearson Education (2004)
6) Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education (2006)

- https://www.electronics-tutorials.ws/
- http://engineering.nyu.edu/gk12/amps-cbri/pdf/Basic%20Electronics.pdf
- https://www.google.com/search?q=cctv+installation+basics&oq=CCTV+installation+basics&aqs=chrome.0.0l6.8327j0j4&sourceid=chrome&ie=UTF-8#kpvalbx=_Skx9X6z4OoWb9QPuh53ABQ18
- https://learncctv.com/cctv-basics/

Semester-I

COURSE TITLE: Mobile Application Programming
Course Code: SDC1MA02

Credits: 4 **No. of Classes: 60 Hours**

Course Objectives:
Mobile Application Programming is a skill-based course assists students to recognize the configurations and working explanation of Mobile Application. This course will provide the introduction to Mobile Application Programming in different Android, iOS and Windows phone 8. Course put main emphasis on Android Development Environment, Android Software Development Platform, its Framework, Handling User Interface (UI) Events and Intents and Intent Filters etc.

Introduction: What is mobile Application Programming, Different Platforms, Architecture and working of Android, iOS and Windows phone 8operating system, Comparison of Android, iOS and Windows phone 8. (6 Hours)

Android Development Environment: What is Android, Advantages and Future of Android, Tools and about Android SDK, Installing Java, Eclipse, and Android, Android Software Development Kit for Eclipse, Android Development Tool: Android Tools for Eclipse, AVDs: Smartphone Emulators, Image Editing,

(10 Hours)

Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine, Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes, Launching Your Application: The AndroidManifest.xml File, Creating Your First Android Application. (12 Hours)

Android Framework Overview: The Foundation of OOP, The APK File, Android Application Components, Android Activities: Defining the User Interface, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications, Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

(14 Hours)

Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android:
Introducing the Drawables, Implementing Images, Core Drawable Subclasses, Using Bitmap, PNG, JPEG and GIF Images in Android, Creating Animation in Android (10 Hours)

Handling User Interface(UI) Events: An Overview of UI Events in Android, Listening for and Handling Events , Handling UI Events via the View Class, Event Callback Methods, Handling Click Events, Touch screen Events, Keyboard Events, Context Menus, Controlling the Focus (8 Hours)

Content Providers: An Overview of Android Content Providers, Defining a Content Provider, Working with a Database.
Intents and Intent Filters: Intent, Implicit Intents and Explicit Intents, Intents with Activities, Intents with Broadcast Receivers

Advanced Android: New Features in Android 4.4**.**
iOS Development Environment: Overview of iOS, iOS Layers, Introduction to iOS application development.
Windows phone Environment: Overview of windows phone and its platform, Building windows phone application.

Suggested Books:

1. Beginning Android 4, Onur Cinar , Apress Publication
2. Professional Android 4 Application Development, Reto Meier, Wrox
3. Beginning iOS 6 Development: Exploring the iOS SDK, David Mark, Apress
4. Beginning Windows 8 Application Development, István Novák, Zoltan Arvai, György Balássy and David Fulop.
5. Professional Windows 8 Programming: Application Development with C# and XML, Allen Sanders and Kevin Ashley, Wrox Publication.

Programming with Mobile Applications: Android, iOS, and Windows Phone 7 , Thomas Duffy, Course Technology, Cengage Learning 2013

References:

- https://www.invonto.com/insights/mobile-app-development-process/
- https://www.tutorialspoint.com/mobile_development_tutorials.htm

Semester-I

COURSE TITLE: PC Hardware & Networking
Course Code: SDC1PC03

Credits: 4 **No. of Classes: 60 Hours**

Unit .1Introduction about Computer 4 Hours

1.1. Basics of computer
1.2. Organization of computer.
1.3. Software and hardware.
1.4. Input/output devices.

Unit 2.Basic networking concepts, 6 Hours

2.1 Network topologies:
2.1.1 LAN, WAN, MAN, PAN, CAN.
2.2 Networking Model
2.2.1. The OSI model
2.2.2. TCP/ IP Model
2.3 Network adapters.

2.4 Introducing protocols.
2.5 Cabling and troubleshooting.

Unit 3 Introduction to various networking devices: 10 Hours

3.1 Routers.
3.2 Switches.
3.3 Modems.
3.4 Hubs etc.
3.5 Wired and Wireless technology.

Unit .4 Inside the PC: 8 Hours

4.1. Opening the PC and identification.
4.2. Study of different blocks,
4.3. Assemblin agnd disassembling

Unit.5 Network basic and configuration: 12 Hours

5.1 Setting IP addresses,
5.2 Sharing files and folders.
5.3 Network troubleshooting.
5.4 PING test, ipconfig etc.

Unit.6 Introduction to servers and network security 20 Hours

6.1 Types of servers:
6.11Files servers,
6.12Email Servers,
6.13Proxy servers etc.
6.2 .Basics of Internet and Intranet:
6.3 .Types of Internet connections:
6.3.1 Dialup, Broadband, Leased Line, Wi-Fi, Wi-Max, 2G, 3G, 4G, WWW, E-mails, Search Engines, Social Networking.
6.3.2 Cloud application.
6.3.3 Audio-video Conferencing.
6.3.4 Voice over Internet Protocol (VOIP).

6.4. Recovery and backup.

6.5. Essential security measures.

Reference:

6.3.5 Computer Networking: A Top-Down Approach (6th Edition)
6.3.6 Network Warrior (2nd Edition)
6.3.7 Routing TCP/IP, Volume 1 (2nd Edition)
6.3.8 Routing TCP/IP, Volume II (2nd Edition)
6.3.9 Networking All-in-One For Dummies
6.3.10 Cisco Networking All-in-One For Dummies
6.3.11 CompTIA Network+ Certification All-in-One Exam Guide (7th Edition)

Semester-II

Course Code: GEC2BN06

Course Title: BASIC NUMERICAL SKILLS

Credits: 4

Total Contact Hours: 60

Marks: 80

Objectives:

To enable the students to acquire knowledge of Mathematics and Statistics.
At the end of this course, the students should have understood set operations, matrix and Mathematics of finance, Statistical tools and their applications.

Unit 1

Sets and Set Operation - Venn Diagrams - Elements of Co-ordinate system - Matrices - Fundamental ideas about matrices and their operational rules - Matrix multiplication - Inversion of square matrices of not more than 3rd order - Solving system of simultaneous linear equations. (10 Hours).

Module 2

Theory of Equations : Meaning - types of equations - Simple linear and Simultaneous equations (only two variables) eliminations and substitution method only - Quadratic equation factorization and formula method ($ax^2 + bx + c = 0$ form only) - Problems on business applications. (10 Hours).

Module 3

Progressions : Arithmetic Progressions - Finding the 'n'th term of an AP and also sum to 'n' terms of an AP - Insertion of Arithmetic means in given terms of AP and representation of AP - Geometric Progression : Finding 'n'th term of GP - Insertion of GMs in given GP and also representation of GP - Mathematics of Finance - Simple and compound interest (Simple problems only).

(10 Hours)

Module 4

Meaning and Definition of Statistics - Scope and limitations - Statistical enquiries - Scope of the problem - Methods to be employed - Types of enquiries - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution.

(15 Hours)

Module 5

Measures of Central Tendency - Arithmetic Mean - Median - Mode - Geometric and Harmonic Mean - Measures of variation and standard, mean and quartile deviations - Skewness and Kurtosis - Lorenz curve. Analysis of Time Series: Methods of measuring - Trend and Seasonal variations - Index number - Unweighted indices -Consumer price and cost of living indices (15 Hours)

(Theory and problems may be in the ratio of 20% and 80% respectively. An over view of the topics is expected and only simple problems shall be given)

References:

- Sundaresan and Jayaseelan - An Introduction to Business Mathematics and Statistical Methods.
- Dr. A K Arte & R V Prabhakar - A Text Book of Business Mathematics.
- Sanchethi and Kapoor- Business Mathematics.
- Gupta S.P- Statistical Methods
- Navaneethan P- Business Mathematics
- R.S.N. Pillai, Mrs. Bhagavathi - Statistics
- P.R. Vittal - Business Mathematics and Statistics

Semester II

COURSE TITLE: Familiarization of Basic Tools it's Operation, Solar Systems, IOT and AI

Course code: SDC2FB05

Credits: 04 **No. of Classes: 60 Hours**

Total Marks: 80

Course Objectives:

The Lack of awareness about testing tools and its Operation results in wastage of Time and money. This Section gives sound knowledge about basics of Instrumentation, Testing and Measuring Techniques, Operation procedures of different type of tools with safety precautions. The Knowledge about these basics results to develop fast trouble shooting skills. This section covers basic tools, like Digital, Multimeter, Tester, CRO, POWER supplies, Function Generator, Clamp Meter, Earth Tester and other testing tools. and Solar home power systems-basics, installation & it's maintenance. Also also helps to familiarize the emerging technologies such as IOT(Internet Of things) and AI(Artificial Intelligence) *This information will be always helpful for a technical person throughout his journey.*

Unit.1 DIGITAL MULTIMETER, BASICS AND OPERATION

(12 Hours)

Voltage measurement basics, Current Measurement basics, Resistance measurement Basics, Diode and Continuity Test , True RMS Measurements, Procedures to reduce Errors, Precautions to be taken while measurements of High Voltage, High Current , Basics Repairing and Standard Operating Procedure of Digital Multimeter etc.

Unit.2 CRO / Digital storage oscilloscope it's operation and basics

(8 hours)

This section covers the basics of Oscilloscope, Voltage Measurement, Frequency Measurement, Calibration Testing, Standard Operating Procedure, Basics of Impedance and its effect in Measurement, Different Type of CRO Test Probes etc.

Unit.3 Basics of power supply and operation

(10 Hours)

This section covers the basics of Voltage source, Current Source, Constant Current Source, Constant Voltage Source, Current Limit Setting, Importance of Output Impedance of Power supply, Maximum Current and Voltage rating of Power supply, Precautions to be taken while handling, Standard Operation Procedure

Unit.4 Operation of function generator, clamp meter and insulation tester

(15 Hours)

OPERATION, the application of Function Generator, Standard Operating Procedure, Things to be taken care while handling the Instruments etc. OPERATION of CLAMP METER, basics of Current measurement, Standard Operating Procedure, Precautions to be taken while handling, INSULATION TESTER it's operation, basics, Standard Operating Procedure, Precautions to be taken while handling, Measuring Insulation resistance of Wires, different material, earth etc**.**

Unit.5. Solar home power systems-basics, installation, maintenance

(20 Hours)

Installation of Solar Home Inverters (both On Grid and Off-Grid), Familiarization of Solar Panel, Solar Inverters, and MPPT Charger, their working, connection and Installation, Photo Voltaic Cell, Solar Panel , Solar Cell in Series and Parallel combination, Solar Cell Characteristics like Open Circuit Voltage, Short circuit Current, Efficiency ,V-I Characteristics, Maximum Power Point, Fill factor, Solar cell response to different wavelength, MPPT Charger Technology, Solar Inverter basics, Different type of Batteries, Batteries in Series and Parallel, AH rating of Battery, Backup time calculation for a Solar Inverter etc

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Unit.6: IOT and AI (15 Hours)

Basics, controlling of home appliances through IOT, IOT MODULES PROGRAMMING, AI (Artificial Intelligence)-Basics of Artificial Intelligence and Robotics, Programming Basics of Microcontrollers, PLC (Programmable Logic Controllers), Digital Signal Processing, Robotics modules practice, simulation software practice

REFERENCES:

https://drive.google.com/file/d/1NAP_qgUqSVjACzfg0khQ13la6dronH37/view

https://youtu.be/660jzzUayCU

https://drive.google.com/file/d/1mBVzKxJwHl2Fr-Nuc0398bfhFLEAtkCm/view

- https://www.teamwavelength.com/power-supply-basics/
- https://www.electronics-notes.com/articles/analogue_circuits/power-supply-electronics/power-supply-overview.php
- https://www.electronics-notes.com/articles/test-methods/signal-generators/function-generator.php
- https://en.wikipedia.org/wiki/Function_generator
- https://www.kew-ltd.co.jp/en/support/mame/detail.php?id=60

https://www.kew-ltd.co.jp/en/support/mame/detail.php?id=59

- https://www.electrical4u.com/megger-working-principle-types-history-uses-of-megger/
- http://www.electronicsandyou.com/solar-panel-installation-guide-step-by-step-process.html

Suggested Books:

1) S. M. Sze, Semiconductor Devices: Physics and Technology, 2ndEdition, Wiley India edition (2002).
2) Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education (2006)
3) Dennis Le Croissette, Transistors, Pearson Education (1989)
4) Jasprit Singh, Semiconductor Devices: Basic Principles, John Wiley and Sons (2001)
5) Kanaan Kano, Semiconductor Devices, Pearson Education (2004)
6) Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education (2006)

Semester-II

Course Title: Applied Electronics Maintenance of scientific Instruments and PCB Design

Course Code: SDC2AE06

Credits: 4 **Marks 80.**

Total Contact Hours: 60

Objectives*:*

Improvement in Technology results in utilization of Computers and microcomputers everywhere in the world. So, Understanding Operation, Installation of both hardware & software; Repairing of Computers is an essential Knowledge for the carrier development. This Session gives idea about Protecting the ESD Sensitive Components from Electro Static Discharge (ESD Protection)- Safety Precautions to be taken, Understanding the Parts and Components of Computers, Idea about Computer Assembling, Installation of Software and Troubleshooting techniques. Also enhances student's understanding of PCB fundamentals, schematic and layout designing and Technologies.

Unit.1 Assembling, Troubleshooting O.S. and other Software Installations

(8 Hours)

Identification basic Components like RAM, Hard disk Drive, Mother Board, SMPS, Processor, Precautions to be taken while handling, ESD Protection Basics, Assembling Procedure, O.S. Installation, Other application software and Installation, Trouble shooting and Fault finding tips etc.

Unit.II. FAMILIARIZATION OF HOUSE WIRING (12 Hours)

Phase, Neutral, Earth; Testing / Fault finding; Precautions to be taken while working with Electricity to avoid Electric Shock., Familiarization of Electrical wiring components like Fuse, Energy Meter, Mains Switch, MCB, ELCB and Its Working; Also gives idea about Domestic Wiring, UPS Wiring, Two way switch ,Wiring of Fan, Light etc.

Unit.III. FAMILIARIZATION OF DIFFERENT HOME APPLIANCES (10 Hours)

Troubleshoot / repair the home appliances: Internal Wiring Diagram of Mixer Grinder,Basic Working & Troubleshooting of LED TV,Basic working & Troubleshooting of Microwave Oven,Internal wiring diagram of Refrigerator,Wiring Diagram and

Troubleshooting of Iron Box , Fan etc.,Internal wiring diagram of Washing Machine,Induction Motor.

Unit.1V. REPAIRING OF SCIENTIFIC INSTRUMENTS (10 Hours)

SMPS Basics and Trouble shooting,LED Basics , Working and Trouble shooting
Two point calibration basic idea,Turbidity Meter,Basic working , components and repairing of Colorimeter,Conductivity Meter,pH Meter,Microscope,CRO, Function Generator, Power supply,Medical equipment in general

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Unit.V PCB Fundamentals: (20 Hours)

PCB Advantages, components of PCB, Electronic components, Microprocessors and Microcontrollers, IC's, Surface Mount Devices (SMD).
Classification of PCB - single, double, multilayer and flexible boards, Manufacturing of PCB, PCB standards.

Schematic & Layout Design: Schematic diagram, General, Mechanical and Electrical design considerations, Placing and Mounting of components, Conductor spacing, routing guidelines, heat sinks and package density, Net list, creating components for library, Tracks, Pads, Vias, power plane, grounding. Technology OF PCB: Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates materials of copper clad laminates, properties of laminates (electrical & physical), types of laminates, soldering techniques. Film master preparation, Image transfer, photo printing, Screen Printing, Plating techniques etching techniques, Mechanical Machining operations, Lead cutting and Soldering Techniques, Testing and quality controls.

PCB Technology: Trends, Environmental concerns in PCB industry

Reference.

- https://www.instructables.com/How-To-Assemble-A-Basic-Desktop-PC/ https://www.crucial.in/articles/pc-builders/how-to-build-a-computer
- https://www.electricaltechnology.org/2015/09/types-of-wiring-systems-electrical-wiring-methods.html
- https://youtu.be/-heKuZNqG_U
- https://www.hometips.com/repair-fix/refrigerator.html

Suggested Books:

1. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.
2. Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TATA McGraw Hill Publisher

Practical I

Code: SDC1PL04 **Credits: 6**

Sl No.	Course Title	Practical
Semester 1		
	Familiarization of Basic Electronic Components	• Familiarization of Electronic Components • Familiarization of Transducers • Lead Identification and Testing of Components • Testing of Mains Transformer & Identification of Primary and Secondary • Characteristics of Relay, MOSFET and IGBT
	Basic Circuit Theory and Network Analysis	• Voltage Devider Circuits • Capacitance is Series and Parallel • RC Face shift and Filter circuits • Series and parallel Resonance • Finding the Output Impedance of a CE Amplifier • Study of clipping and clamping circuits. • Basic LED Dancing light using Microcontroller Programming • RC Circuits & RC Filter • Preparation of Rectifier (Full wave and Half Wave) • Rectifier with filter capacitor • Zener Diode Regulator • Transistor as a Switch • Common emitter amplifier using Transistor • Bandwidth of CE Amplifier • MOSFET and IGBT Characteristics • Controlling Load using Relay • Light Detector Circuit
	Familiarization of Basic Tools and Operation	• Measurements and Standard Operating Procedure of DMM • Measurements and Standard Operating Procedure of CRO • Controls and Understanding the Specifications of Regulated Powersupply

		• Adjusting the Voltage, Frequency, Duty cycle, DC Offset and Measuring the Parameters • Measuring AC&DC Current using Clamp meter Measuring Insulation resistance earth etc.
	Mobile Application Programming	• SMD Soldering / Rework practice Android Application development basics
	PC Hardware & Networking	• Introduction about computer • Basic Networking concepts • Introduction to various various Networking devices • Inside the PC • Network basic and configuration Introduction to servers and network security
	CCTV Basics, Installation & Configurations.	• Familiarization of CCTV Camera • Familiarization of DVR • Connecting the HDD and Basic Configurations • Wiring and setting up CCTV system • Familiarization of Network Camera & DVR
Code: SDC2 PL07	**Semester 2**	**Practical II** **Credits:5**
	Assembling the PC, Troubleshooting and O.S. and other Software Installations	• Familiarization of ESD protection tools • Assembling the PC • O.S. Installation Trouble shooting of failure of SMPS, RAM, Motherboard etc.
	Solar Power System Installation and Maintenance	• Solar Cell Characteristics like Open Circuit Voltage, Short circuit Current, Efficiency ,V-I Characteristics, Maximum Power Point, Fill factor, Solar cell response to different wavelength etc. • Solar cell in Series and Parallel Combination • Solar Panel Installation • Backup time with Different Capacity batteries MPPT Charger and Solar Inverter

		Familiarization and Installation etc
	Electrical Wiring	• Familiarization of MCB, ELCB, Energy meter, Mains Switch and its wiring. • Different types of wires and its Current capacity • Understanding the working of Different electrical components • Wiring of Light, Two Way switch etc • UPS Wiring • Testing of Earth • Identification of Face and neutral and Standard Color codes used. Connecting different appliances with Circuit diagram
	Applied Electronics	• Internal Wiring Diagram of Mixer Grinder • Basic Working & Troubleshooting of LED TV • Basic working & Troubleshooting of Microwave Oven • Internal wiring diagram of Refrigerator. • Wiring Diagram and Troubleshooting of Iron Box , Fan etc. • Internal wiring diagram of Washing Machine Induction Motor etc.
	Maintenance of Scientific Instruments	• SMPS Basics and Trouble shooting • LCD Basics , Working and Trouble shooting • Two point calibration basic idea • Turbidity Meter • Basic working , components and repairing of Colorimeter • Conductivity Meter • pH Meter • Microscope • CRO, Function Generator, Power supply Medical equipment in general
	IOT, AI & Robotics	• IOT MODULES PROGRAMMING • ESP 8266, NODE MCU, D1 MINI, AURDUINO UNO FAMILARISATION AND

		PROGRAMMING • MICROCONTROLLER PROGRAMMING ETC • ROBOTICS MODULES PRACTICE SIMULATION SOFTWARE PRACTICE
	INTERNSHIP	• Circuit Designing • PCB Designing • Placing and Soldering of Components • Cabinet Designing • Testing and Calibration Preparing the Specification etc.

CONDITIONS FOR ADMISSIONS ELIGIBILITY

 Basic eligibility for Diploma is 10+2 and with science stream (No age limit)
 The eligibility criteria for admission shall be as announced by the College/University

RESERVATION/QUOTA
A maximum of 50 students can be admitted to one Diploma program.
The reservation rules for Government/Aided Colleges are as same as that of the regular UG programmes conducted in colleges affiliated to this university.

FEES STRUCTURE
1. The course fee and examination fees will be decided by the University.
2. The college can collect Caution deposit, PTA fund, special fees, university fees, etc according to the norms provided by the university at the time of admission.
3. After First year, with the consent of university/UGC, the college can conduct the same programme in self-financing mode (provided UGC not granting further funds).
4. The course fee and examination fee (Regular/ improvement/ supplementary) structure in self financing mode will be decided by the University.

REGISTRATION/RE-REGISTRATION

Every candidate should register for all subjects of the Semester-End examinations of each Semester. A candidate who does not register will not be permitted to attend the Semester-End Examinations; he/she shall not be permitted to attend the next semester. A candidate shall be eligible to register for any higher semester, if he/she has satisfactorily completed the course of study and registered for the examination. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

COURSE CALENDAR

The Diploma program conducted by the affiliated institutions follows a separate calendar

from the conversional degree/ PG program. The program is distributed over two Semesters and each semester constitute 90 working days inclusive of examination.

Note: Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of students, details of faculty members allotted from the college and from industry partners along with their qualification and year of experience, to the University. Also, Head of each Institution shall ensure the availability of sufficient number of faculty members having experience and qualifications in the institution.

ASSESSMENT OF STUDENTS

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. This dual mode assessment will be applicable to both Theory and Practical courses except for internship and project. Total marks in theory course reflect 80 marks external and 20 marks internal assessments. The mark division for practical courses are 20 marks internal and 80 marks external. For internship and project, there is no internal assessment.

Sl No	Courses	Internal	External
1	Theory	20	80
2	Practical	20	80
3	Internship/Project	0	100

INTERNAL

Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as homework, problem solving, group discussions, literature survey, seminar, team project, software exercises, etc.) as decided by the faculty handling the course, and regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record.

EXTERNAL

- Semester- End examinations for theory and practical courses will be conducted by the University. There shall be University examinations at the end of each semester for both theory and practical. Failed or improvement candidates will have to appear for the Semester- End examinations along with regular students.

- Head of Institution/ Chief of Examination of the college should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.

- University will be issuing mark list, provisional/original certificates to the candidates.

INTERNSHIP AND PROJECT **Course Code:** SDC2IP08

Internship and the major project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 100% external assessment.

1. There will be internship at the end of the second semester.
2. Every student will be assigned an internal guide, allotted from the parent Department concerned or an expert available in the college/industry appointed by the principal or the head of the department/concerned authority
3. The student has to make regular discussions with the guide/supervisor while Choosing the subject/area and throughout the life time of the project.
4. At least three reviews should be conducted to evaluate the progress of work.
5. An evaluation team is constituted for conducting the evaluation. The team consists of external examiner, allotted by the university from the approved examination panel, representative from the industry and a faculty.
6. Students should submit a report of their work. A valid certificate from the organization should be produced as a proof that the work is carried out in the respective organization.
7. Students are required to demonstrate the working model of their work (if possible) to the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.
8. Mark distribution for internship assessment

Distribution	**Marks**
Content and relevance of Dissertation	**60**
Viva	**20**
Presentation	**20**

MINIMUM FOR PASS

The successful completion of all the courses prescribed for the diploma programme with E grade (40 %) shall be the minimum requirement for the award of diploma/degree.

Notes:

1. For Project/internship, the minimum for a pass shall be 50% of the total marks assigned to the respective examination.
2. A student who does not secure this pass marks in a subject will have to repeat the respective subject.

3. If a candidate has passed all examinations of the Course (at the time of publication of results of last semester) except project/internship in the last semester, a re-examination for the same should be conducted within one month after the publication of results. Each candidate should apply for this Save-A-Year examination within one week after the publication of last semester results.

IMPROVEMENT/SUPPLEMENTARY

Candidates shall be allowed to improve the grade of any two theory courses in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more than10% mark variations in the improvement chance, marks scored in the improvement chance will be considered for grading of the course; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and

internal continuous assessment.

ATTENDANCE

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

(a) He/she must secure not less than 75% attendance in the total number of working hours in each semester.

(b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.

(c) His/her conduct must be satisfactory It shall be open to the University to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

- The shortage shall not be more than 10%
  Shortage up to 20% shall be condoned once during the entire course provided such shortage is caused by continuous absence on genuine medical grounds.
- Shortage shall not be condoned more than twice during the entire course.
  candidate who is not eligible for condonation of shortage of attendance shall repeat the semester as per University norms.

PATTERN OF QUESTION PAPERS

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

(a) Covering all sections of the course syllabus and total marks from each module should be approximately same.

(b) Unambiguous and free from any defects/errors

(c) Emphasizing knowledge testing, problem solving & quantitative methods

(d) Containing adequate data/other information on the problems assigned (e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows

Section	Total No Of Questions	No of Questions to be Answered	Marks for each Question	Total Marks
A: Very Short/ Objective answer Questions	10	10	1	10
B: Short answer Questions	12	8	2	16
C: Short Essays/Problems	9	6	4	24
D: Essays	4	2	15	30
Total				80

And for practicals

Marks Distribution	Total Marks
Theory/ Algorithm/Flow diagram	20
Implementation	30
Result/Output	10
Record	10
Viva	10
Total	80

CREDIT SYSTEM

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops/IT and tutorials*;*
For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops*;*
For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

INDIRECT GRADING SYSTEM

Indirect Grading System based on a 7 -point scale is used to evaluate the performance of students.
Each course is evaluated by assigning marks with a letter grade (A+, A, B, C, D, E or F) to that course by the method of indirect grading.
An aggregate of E grade with 40 % of marks (after external and internal put together) is required in each course for a pass and also for awarding a degree/diploma.
Appearance for Internal Assessment and End Semester Evaluation are compulsory and no grade shall be awarded to a candidate if she/he is absent for Internal Assessment / End Semester Evaluation or both.
For a pass in each course 40% marks or E grade is necessary.
A student who fails to secure a minimum grade for a pass in a course is permitted to write the examination along with the next batch.
After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of a semester, a student should pass all courses. However, a student is permitted to move to the next semester irrespective of SGPA obtained.

SGPA of the student in that semester is calculated using the formula

SGPA = Sum of the credit points of all courses in a semester Total credits in that semester

The Cumulative Grade Point Average (CGPA) of the student is calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following

$$\text{CGPA} = \frac{\text{Total credit points obtained in six semesters}}{\text{Total credits acquired (180)}}$$

SGPA and CGPA shall be rounded off to two decimal places. CGPA determines the broad academic level of the student in a programme and is the index for ranking students (in terms of grade points).

- An overall letter grade (Cumulative Grade) for the entire programme shall be awarded to a student depending on her/his CGPA

Marks scored	Grade	Remarks
90 and Above	A+	Outstanding
80 to 89	A	Excellent
70 to 79	B	Very Good
60 to 69	C	Good
50 to 59	D	Satisfactory
40 to 49	E	Adequate
Below 40	F	Failure

GRADE CARDS

The University shall issue to the students grade/marks card (by online) on completion of each semester, which shall contain the following information:

Name of University

Title of Programme
Semester concerned
Name and Register Number of student
Code number, Title and Credits of each course opted in the semester
Internal marks, External marks, total marks, Grade point (G) and Letter grade in each course in the semester
The total credits, total credit points and SGPA in the semester (corrected to two decimal places)

Percentage of total marks The final Grade/mark Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. However, as already mentioned, for the computation of CGPA only the best performed courses with maximum grade points alone shall be taken subject to the minimum credits requirements (180) for passing a specific degree. The final grade card shall show the percentage of marks, CGPA (corrected to two decimal places) and the overall letter grade of a student for the entire programme. The final grade/mark card shall also include the grade points and letter grade of general course and skill developmental courses separately. This is to be done in a seven point indirect scale.

This Syllabus is prepared after the Skill gap identified in the present and Future Potential possibilities from the Electronics Market.